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a Continuation-in-Part of U.S. Patent Application No. 08/595,365, filed on February 1, 1996, now issued U.S. Patent No. 5,738,096, which claims the benefit of Ser. No. 60/009,769, filed on Jan. 11, 1990, which is a § 371 filing of PCT/US95/01103, filed on Jan. 24, 1995; which is a CIP of U.S. Application No. 08/293,859, filed on Aug. 19, 1994, now abandoned, and a CIP of U.S. Application No. 08/311,593, filed on Sep. 23, 1994, now issued U.S. Patent No. 5,546,951; which is a Division of U.S. Application No. 08/094,539, filed on Jul. 20, 1993 now issued U.S. Patent No. 5,391,199.

In the Claims:

Please renumber Claims 1-36 as new Claims 145-180 as follows:

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145. A method for mapping a heart comprising the steps of:
- inserting a mapping catheter having an ultrasonic position sensor into the heart;
 - inserting at least one reference catheter having an ultrasonic position sensor into the heart;
 - determining the position of the mapping catheter relative to the at least one reference catheter; and
 - mapping a portion of the heart with the mapping catheter.
146. The method according to Claim 145, further comprising determining the position of the tip of the mapping catheter relative to the at least one reference catheter.
147. The method according to Claim 146, further comprising creating a geometric map of the portion of the heart with the mapping catheter based on the position of the tip of the mapping catheter.
148. The method according to Claim 147, further comprising mapping electrical activity of the portion of the heart with at least one electrode mounted at the tip of the mapping catheter.

149. The method according to Claim 148, further comprising reconstructing a surface of the heart based on the position of the tip of the mapping catheter.

150. The method according to Claim 147, further comprising performing a therapeutic procedure on the portion of the heart.

151. The method according to Claim 150, further comprising performing an ablation procedure on the portion of the heart.

152. The method according to Claim 147, further comprising measuring impedance of the portion of the heart.

A2 153. The method according to Claim 147, further comprising measuring mechanical information of the portion of the heart.

154. The method according to Claim 153, further comprising measuring movement of the portion of the heart.

155. A method for mapping a heart comprising the steps of:
inserting a mapping catheter having an ultrasonic position sensor into the heart;
inserting at least one reference catheter having an ultrasonic position sensor outside of the heart;
determining the position of the mapping catheter relative to the at least one reference catheter; and
mapping a portion of the heart with the mapping catheter.

156. The method according to Claim 155, further comprising determining the position of the tip of the mapping catheter relative to the at least one reference catheter.

157. The method according to Claim 156, further comprising creating a geometric map of the portion of the heart with the mapping catheter based on the position of tip of the mapping catheter.

158. The method according to Claim 157, further comprising mapping electrical activity of the portion of the heart with at least one electrode mounted at the tip of the mapping catheter.

159. The method according to Claim 158, further comprising reconstructing a surface of the heart based on the position of the tip of the mapping catheter.

160. The method according to Claim 157, further comprising performing a therapeutic procedure on the portion of the heart.

161. The method according to Claim 160, further comprising performing an ablation procedure on the portion of the heart.

162. The method according to Claim 157, further comprising measuring impedance of the portion of the heart.

163. The method according to Claim 157, further comprising measuring mechanical information of the portion of the heart.

164. The method according to Claim 163, further comprising measuring movement of the portion of the heart.

165. A method for mapping a heart comprising the steps of:

- (a) inserting a mapping catheter having an ultrasonic position sensor into the heart;
- (b) inserting at least one reference catheter having an ultrasonic position sensor into the heart;

- (c) bringing the tip of the mapping catheter into contact with a wall of the heart at a location;
- (d) determining a position of the tip of the mapping catheter at the location;
- (e) adding the position to a map;
- (f) moving the tip of the mapping catheter to a second location; and
- (g) repeating steps (d) - (f).

166. The method according to Claim 165, further comprising reconstructing a surface of the heart based on the determined positions.

AZ 167. The method according to Claim 165, further comprising mapping electrical activity of the surface of the heart with at least one electrode mounted at the tip of the mapping catheter.

168. The method according to Claim 165, further comprising performing a therapeutic procedure on the surface of the heart.

169. The method according to Claim 168, further comprising performing an ablation procedure on the surface of the heart.

170. The method according to Claim 166, further comprising measuring impedance of the surface of the heart.

171. The method according to Claim 166, further comprising measuring mechanical information of the surface of the heart.

172. The method according to Claim 171, further comprising measuring movement of the surface of the heart.

173. A method for mapping a heart comprising the steps of:

- (a) inserting a mapping catheter having an ultrasonic position sensor into the heart;
- (b) inserting at least one reference catheter having an ultrasonic position sensor outside of the heart;
- (c) bringing the tip of the mapping catheter into contact with a wall of the heart at a location;
- (d) determining a position of the tip of the mapping catheter at the location;
- (e) adding the position to a map;
- (f) moving the tip of the mapping catheter to a second location; and
- (g) repeating steps (d) - (f).

A2 174. The method according to Claim 173, further comprising reconstructing a surface of the heart based on the determined positions.

175. The method according to Claim 174, further comprising mapping electrical activity of the surface of the heart with at least one electrode mounted at the tip of the mapping catheter.

176. The method according to Claim 174, further comprising performing a therapeutic procedure on the surface of the heart.

177. The method according to Claim 176, further comprising performing an ablation procedure on the surface of the heart.

178. The method according to Claim 174, further comprising measuring impedance of the surface of the heart.

179. The method according to Claim 174, further comprising measuring mechanical information of the surface of the heart.

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180. The method according to Claim 179, further comprising measuring movement of the surface of the heart.

